Renewable Energy Systems in the Peruvian Amazon Region (RESPAR)

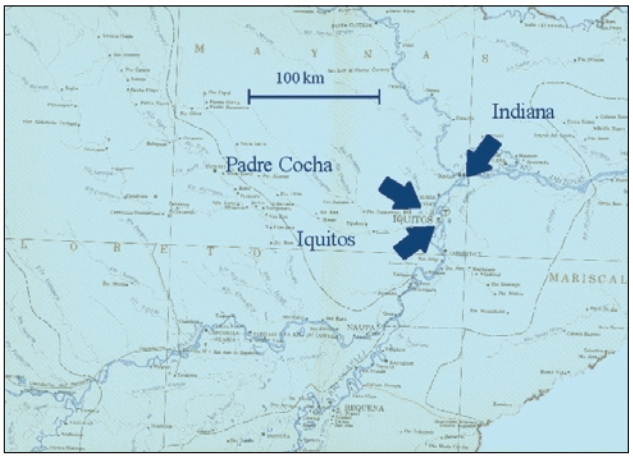
Location: Indiana and Padre Cocha in Loreto, Peru
Type: Rural community electrification
Size: Indiana, 600 kW/d; Padre Cocha, 300 kW/d
Funding: Total: US$2,740,500
Private: US$1,503,000
Public: US$1,237,500
Objective: To provide 24-hour electricity to rural communities.
Duration: 2002–2004
Scale: Rural

Summary

Integrating solar renewable energy, advanced batteries, and high-quality electronic control systems with existing diesel generators in remote villages will provide 24-hour-per-day electricity and significantly reduce diesel fuel usage, costs, and noxious air emissions. Rural communities that are not connected to a power grid will no longer have to depend on diesel generators, which require frequent maintenance, use expensive fuel, and release noxious emissions, to produce only a few hours of electricity per day. Remote Area Power Supply (RAPS) systems will help alleviate poverty, improve lifestyles, and improve environmental conditions.

In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development
- Institution building and access to justice and enforcement of laws



The Peruvian Rural Electrification Program and the Peruvian tariff treatment in the Loreto region helped attract private financing by allowing utilities to operate under standard commercial practices. Thus, management teams can function independently of the government, and staff with skills matched to the job can be hired and trained.

Also attracting private investment were activities to increase public participation in energy decision making. These included stakeholder partnerships and exchanges and participation in international forums to increase energy-sector professional knowledge of energy practices. Public input on pricing and payment issues was solicited, and the results were incorporated into energy policies.

Financing

Total project investment was US$2,740,500. Private funding sources included Common Fund for Commodities (US$600,000), Australian International Greenhouse Partnership (US$105,000), Solar Energy Industries Association (SEIA) (US$18,000), Ferreyros (Peru) (US$80,000), and International Lead Zinc Research Organization (ILZRO) (US$700,000). Electro Oriente (Peru) provided an in-kind loan of US$713,000.

Public funding sources included Regional Government of Loreto (US$385,000), Global Environment Facility (GEF) (US$747,500); United States Department of Energy (USDOE) (US$80,000), and National Association of State Development Agencies (NASDA) (US$25,000).

The Project

The objective of the project is to help ensure sustainable development of communities by providing electricity to increase income-generating activities. By incorporating solar renewable energy, advanced batteries, and high-quality electrical control systems with existing diesel generation, RAPS systems will provide 24-hour-per-day electricity and greatly reduce diesel fuel use. Diesel fuel reductions mean lower fuel costs and reduced environmental damage.

Sustainability of the RAPS system is based on identifying and promoting income-generating activities for community members that are compatible with the ancestral habits of the

inhabitants, rational use of natural resources, and minimal energy consumption. Local utilities will benefit with the increased business from the communities.

The project development period is July 2002 to July 2004. Currently, equipment is being transferred to and installed in the village sites.

Technical Data

The RAPS technology consists of two to four modules, each capable of 150 kWh per day (rps-150), designed to operate in parallel, with the capacity to provide electric energy of 300 to 600 kWh per day. The systems consist of a battery bank of 750 Ah to 240 VDC, a power conversion system of 40 kW, and an assembly of photovoltaic (PV) panels with a maximum capacity of 50 kWp.

Also included is a control system to monitor the voltages, currents, and temperatures of the battery bank; current and voltage of the solar panel assemblies; ambient temperature; and other system parameters to determine operating conditions and the need for modification. Indiana will have four modules and Padre Cocha will have two. A generator will be included as an additional power source for each of the two systems.

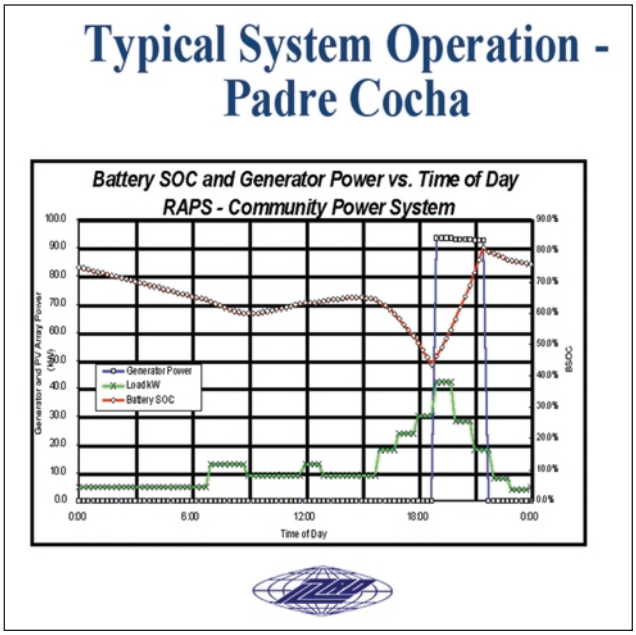
The RAPS system includes recycling plans. The battery installer will remove and send the old, lead-containing batteries to a recycling center. All batteries will be replaced at the same time and will be removed from the community in an environmentally appropriate manner. The financial incentive for recycling is the significant salvage value of the used batteries. Disposal of used lubrication oil from remote diesel generators has traditionally been a problem. However, the reduction in hours of RAPS generator operations means that only 4 oil changes are required a year as opposed to the usual 35. Smaller amounts of used oil production mean that disposal can occur once a year during fuel delivery or maintenance visits.

Performance Data

Diesel fuel savings of 466,000 L/yr are expected. Actual performance data are not yet available.

Participants and Roles

In July 1997, ILZRO, the SEIA, the Direccion Ejecutiva de Proyectos (DEP) of the Ministry of Energy and Mining (MEM) of Peru, and, later the Regional Government of Loreto, signed a Memorandum of Understanding to collaborate on reducing diesel fuel dependence by using a PV-battery-diesel hybrid system.



Key participants include the following: GEF focal point in Peru (Consejo Nacional del Ambiente [CONAM]); United Nations Development Program (UNDP)-Peru; MEM and DEP in charge of the National Electrification Plan; Solar Energy Industries Association (Solar Energy Research and Education Foundation [SEREF]/SEIA); the Regional Administration of Loreto (Consejo Transitorio de Administración [CTAR]-Loreto); the National Fund for Social Programs (Foncodes); Solarex/Ferreyros; Doe Run Peru; Indiana and Padre Cocha communities; and local nongovernmental organizations.

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